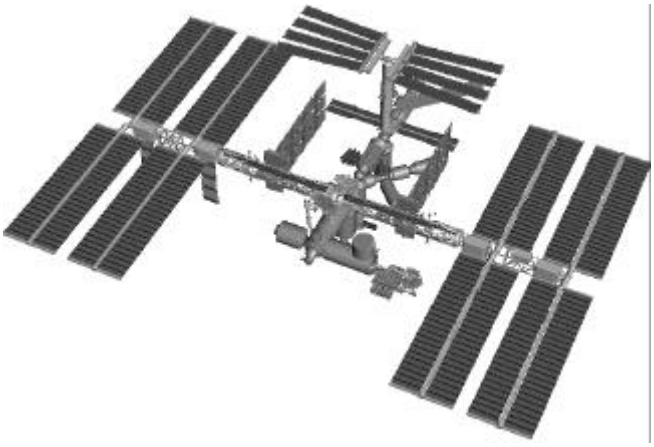
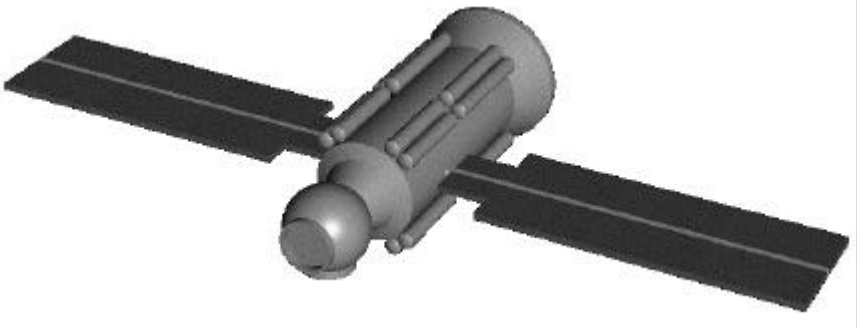
NASA Facts
National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center

International Space Station June 1997

INTERNATIONAL SPACE STATION ASSEMBLY SEQUENCE (9/30/97 Rev C)





Date	Flight	Launch Vehicle	Configuration	Element(s)	Rationale
June 1998	1A/R	Russian		• Functional Cargo Block (FGB)	• FGB is a self-supporting active vehicle. • It provides propulsive control capability and power through the early assembly stages. • It provides fuel storage capability. • It provides rendezvous and docking capability to the Service Module.
July 1998	2A	US Orbiter		• Node 1 • Pressurized Mating Adapters -1 & -2	• Launched passive with PMA-1, PMA-2 and 1 stowage rack. • PMA-1 provides the interfaces between US and Russian elements. PMA-2 provides a Shuttle docking location. • Eventually, Node 1's six ports will provide connecting points for the Z1 truss; U.S. lab; airlock; cupola; Node 3; and the early MPLM as well as the FGB.
Dec 1998	1R	Russian		• Service Module	• Primary Russian element. It provides Environmental Control & Life Support System (ECLSS) functions to all elements. • Primary docking for Progress-type resupply vehicles • Provides propulsive attitude control and reboost capability
Dec 1998	2A.1	US Orbiter		• Spacehab Double Cargo Module	• Logistics and resupply cargo
Jan 1999	3A	US Orbiter		• Integrated Truss Structure (ITS) Z1 • PMA-3 • Ku-band • Control Moment Gyros (CMGs)	• ITS Z1 allows the temporary installation of the P6 Photovoltaic (PV) module to Node 1 for early US based power • Ku-band communication system supports early science capability on 6A • CMGs provide non-propulsive attitude control when activated on 5A • PMA-3 provides a Shuttle docking for the P6 PV Module on 4A and Lab installation on flight 5A
Jan 1999	2R	Russian		• Soyuz	• Establishes first station manning with three-person crew • Provides assured crew return capability without the Orbiter present

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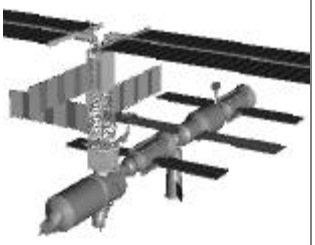
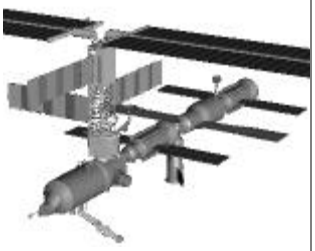
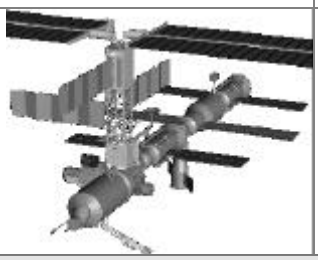
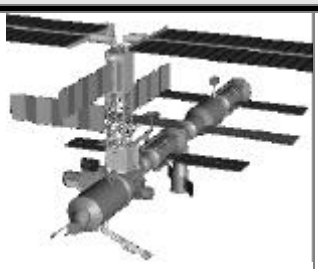
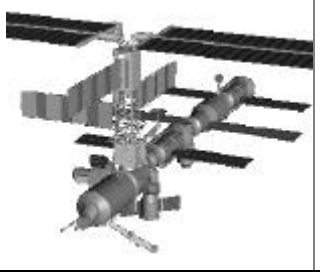
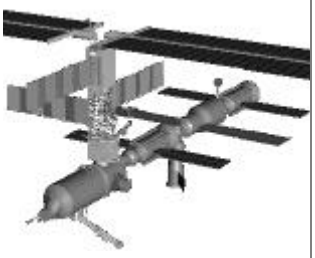
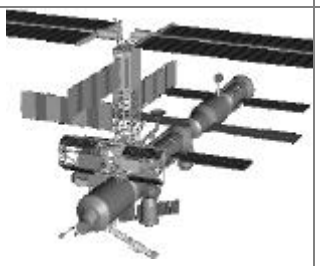
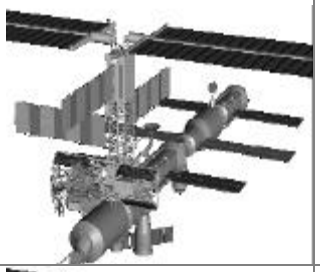
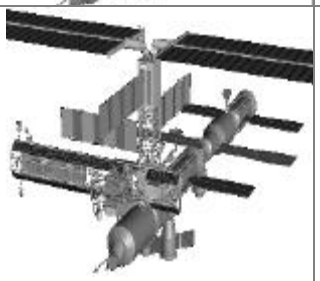
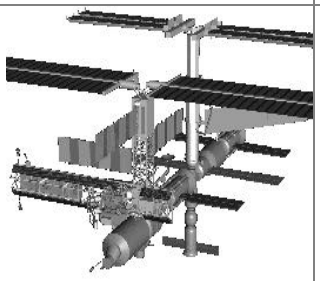
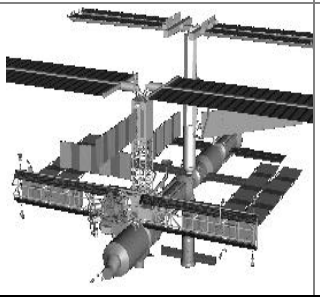
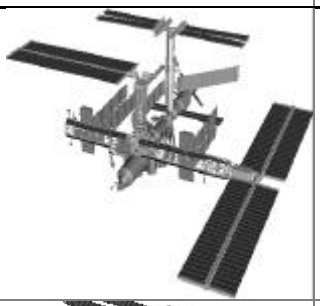
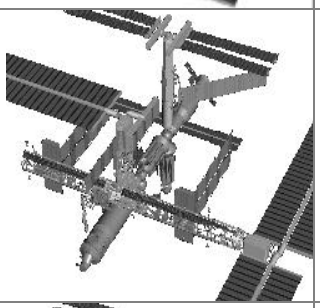
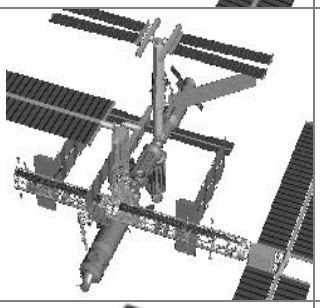
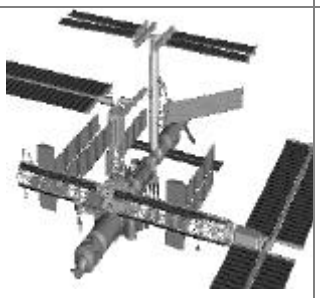
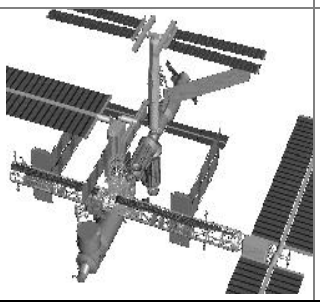
April 1999	4A	US Orbiter		• ITS P6	• Establishes initial US PV Module based power capability • Installed in a temporary location on top of the Z1 Truss until Flight 1J/A when it is permanently attached to the P5 Truss • Includes 2 PV Thermal Control System (TCS) radiators for early active thermal control. Also, the S-band communications system is activated.
May 1999	5A	US Orbiter		• Lab	• Provides initial US user capability • Launched with 5 system racks preintegrated • CMGs are activated
June 1999	6A	US Orbiter		• MPLM (Lab outfitting flight) • Ultra High Frequency (UHF) antenna • Space Station Remote Manipulating System (SSRMS)	• Adds US LAB outfitting with 6 system racks, one storage rack • UHF antenna provides space-to-space communications capability for US based EVA • Delivers Canadian SSRMS needed to perform assembly operations on later flights
Aug 1999	7A	US Orbiter		• Joint Airlock • High Pressure Gas Assembly	• Airlock provides Station-based EVA capability for US and Russian suits • High pressure gas assembly augments the Service Module gas resupply system
			Phase II Complete		
Nov 1999	7A.1	US Orbiter		• MPLM	• U.S. stowage racks, ISPRs • Two additional battery sets are delivered and installed on the P6 PV Module providing a full complement of batteries
Dec 1999	4R	Russian		• Docking Compartment 1	• Provides egress, ingress for Russian based Extravehicular Activity (EVA) and a Soyuz docking port

Date	Flight	Launch Vehicle	Configuration	Element(s)	Rationale
Jan 2000	UF-1	US Orbiter		• MPLM (ISPRs) • PV Module batteries	• Provides payload utilization delivering US Lab ISPR racks; two storage racks
Feb 2000	8A	US Orbiter		• ITS S0 • Mobile Transporter (MT)	• ITS S0 provides attachment and umbilicals between pressurized elements and permanent truss-mounted distributed system/utilities • Airlock spur provides an EVA translation path from the airlock to the truss • The MT which provides the truss translation capability for the Mobile Servicing System is also delivered
Mar 2000	UF-2	US Orbiter		• MPLM (ISPRs) • MBS • Lab Sys.	• Provides additional payloads • MBS provides truss based SSRMS capability • Three additional stowage racks are delivered
June 2000	9A	US Orbiter		• ITS S1 • CETA Cart A	• Delivers the starboard US Central Thermal Control System • Radiators remain stowed until power system is activated on flight 12A • Provides second string of S-band capability • The CETA Cart provides EVA crew translation capability along the truss
July 2000	9A.1	US Orbiter		• SPP with four solar arrays	• Delivery of the Russian power/control mast with four solar arrays providing additional Russian power • Delivers European Robotic Arm (ERA)
Oct 2000	11A	US Orbiter		• ITS P1 • CETA Cart B	• Delivers the port US central thermal control system • Radiators remain stowed until power system is activated on flight 12A • The CETA Cart provides EVA crew translation capability along the truss

Date	Flight	Launch Vehicle	Configuration	Element(s)	Rationale
Nov 2000	12A	US Orbiter		• ITS P3/P4	• Provides additional US power • Port & starboard central TCS radiators are deployed and activated • Transition from early P6 based power to permanent truss based power begins
Dec 2000	3R	Russian		• Universal Docking Module	• Provides docking locations for Russian Research Modules, Life Support Modules and a second docking compartment (DC2) for Soyuz vehicles
Dec 2000	5R	Russian		• Docking Compartment 2 (DC2)	• Replaces discarded DC1
Mar 2001	13A	US Orbiter		• ITS S3/S4	• Provides additional US power • The P6 PV module solar arrays are retracted in preparation for relocation on 1 J/A
Apr 2001	10A	US Orbiter		• Node 2 • Nitrogen tank assembly	• Node 2 provides attach locations for the Japanese Experiment Module, the ESA Columbus Orbital Facility, the Centrifuge Accomodation Module and later Mini-Pressurized Logistics Modules • Establishes the primary docking location for the Shuttle • Nitrogen tank assembly added to sidewall carrier
May 2001	1J/A	US Orbiter		• JEM ELM PS • ITS P5 • High Pressure O2 tanks	• Delivers 4 JEM system racks and 1 stowage rack allowing 1 fault-tolerant JEM PM activation on the next flight • 3 JEM ISPRs delivered providing utilization on the next flight • ITS P5 spacer provides clearance between port PV modules enabling P6 PV module relocation

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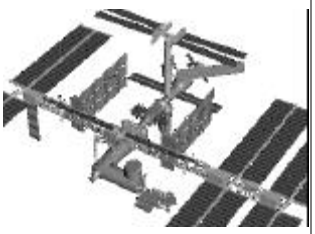
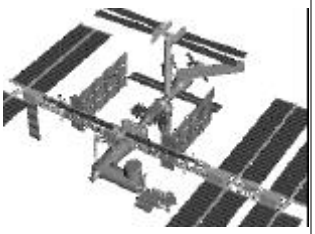
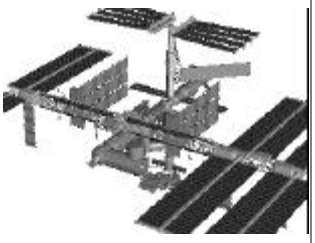
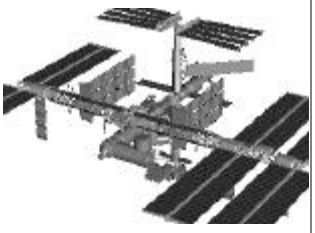
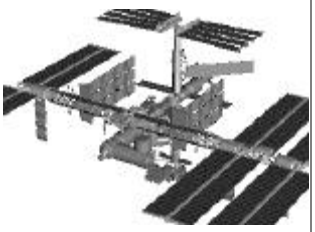
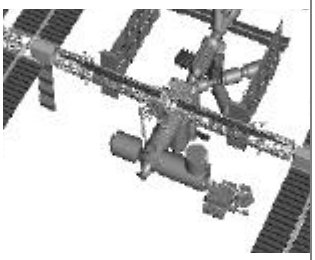
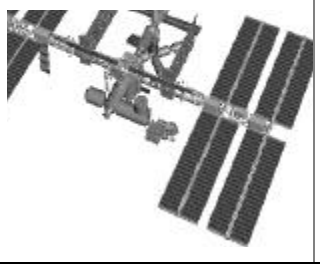
Aug 2001	1J	US Orbiter		• JEM PM	• Japanese Experiment Module is delivered & activated (four JEM sys. racks) • JEM RMS is delivered & activated
Sep 2001	UF-3	US Orbiter		• MPLM (ISPRs)	• Provides for payload resupply and/or changeout
Jan 2002	UF-4	US Orbiter		• Express Pallet • SLP (SPDM, ATA, HP Gas)	• Express Pallet transports external payloads • Special Purpose Dexterous Manipulator ("Canada Hand") provides robotics maintenance capability • Spacelab Palllet (SLP) carries Special Purpose Dexterous Manipulator ("Canada Hand") which provides robotics maintenance capability; Ammonia Tank Assembly (ATA); and High Pressure Gas O2 tank.
Feb 2002	2J/A	US Orbiter		• JEM EF • ELM ES • PV Module Batteries	• Delivers JEM exposed experimental facilities • PV batteries complete battery complements on PV modules P4 & S4
Feb 2002	9R.1	Russian		• Docking & Stowage Module-1	• Mounted to the FGB nadir port • Provides additional on-orbit stowage and a Soyuz docking location
May 2002	9R.2	Russian		• Docking & Stowage Module- 2	• Mounted to Docking and Stowage Module-1 • Provides additional on-orbit stowage and a Soyuz docking location

Date	Flight	Launch Vehicle	Configuration	Element(s)	Rationale
May 2002	14A	US Orbiter		• Cupola and Port Rails (on SLP) • 4 SPP Solar Arrays	• Cupola provides direct viewing capability for some robotics operations and payload viewing • Completes Solar Power Platform solar arrays
June 2002	UF-5	US Orbiter		• MPLM (ISPRs) • Express Pallet	• Provides for payload resupply and/or changeout • Express Pallet transports external payloads
July 2002	20A	US Orbiter		• Node 3	• Delivers Node 3 to be attached underneath Node 1. • 2 avionics and 2 ECLSS racks delivered. • Node 3 provides attachment points for the U.S. Habitation Module, the Crew Return Vehicle and PMA-3
Aug 2002	8R	Russian		• Research Module 1	• Provides Russian experiments and research facilities
Oct 2002	1E	US Orbiter		• Columbus Orbital Facility	• European Space Agency (ESA) research facility provides additional research capability
Nov 2002	10R	Russian		• Research Module 2	• Provides Russian experiments and research facilities

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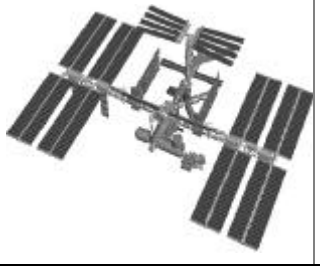
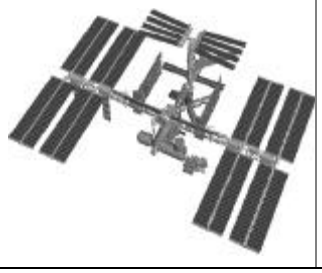
Nov 2002	17A	US Orbiter		• MPLM • Node, Lab racks	• Outfits Node 3 with 4 racks – 2 Environmental Control and Life Support System racks and 2 Flight Crew Equipment racks (waste collection system and galley) • Three Crew Health Care System racks delivered • Delivers 1 U.S. Lab rack, 1 stowage rack, ISPRs
Jan 2003	11R	Russian		• Life Support Module 1 (LSM1)	• Life Support Module provides oxygen regeneration capability & other life support functions
Mar 2003	12R	Russian		• Life Support Module 2 (LSM2)	• Second Life Support Module provides oxygen regeneration capability & other life support functions
Mar 2003	18A	US Orbiter		• CRV 1	• Crew Return Vehicle attached to the station provides additional 4-person crew return capability added to already existing 3-person Soyuz crew return capability
Apr 2003	19A	US Orbiter		• MPLM	• Delivers 4 crew quarters racks to be placed in Node 2 and provide for transition to 6-person crew • Delivers 6 U.S. stowage racks
Jul 2003	15A	US Orbiter		• PV Module S6	• Fourth U.S. truss-based PV module completing the major power system elements • Starboard MT/CETA rails

Date	Flight	Launch Vehicle	Configuration	Element(s)	Rationale
Aug 2003	UF-6	US Orbiter		• MPLM (ISPRs)	• Provides for payload resupply and/or changeout • Delivers two photovoltaic batteries to complete station battery outfitting
Oct 2003	UF7	US Orbiter		• Centrifuge Accomodations Module	• Centrifuge Accommodations Module attached to Node 2 zenith port enhances user research capabilities
Dec 2003	16A	US Orbiter		• U.S. Habitation Module	• Delivers U.S. Habitation Module to enhance crew accomodations.

NOTES:

- ***Additional Progress, Soyuz, H-II Transfer Vehicle and Automated Transfer Vehicle flights for crew transport, logistics and resupply are not listed.***